

The Effects Socioeconomic Status,
Nutrition, and Physical Activity
Have on the Youth

A Synthesis Project
Presented to the
Department of Kinesiology, Sport Studies, and Physical Education
The College at Brockport
State University of New York

In Partial Fulfillment
Of the Requirements for the Degree
Master of Science in Education
Concentrated in Athletic Administration

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Title of Synthesis Project: The Effects Socioeconomics Status, Nutrition, and Physical Activity
Have on the Youth

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5/22/19

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Accepted by the Department of Kinesiology, Sport Studies, and Physical Education, The College at Brockport, State University of New York, in partial fulfillment of the requirements for the degree Master of Science in Education (Physical Education Pedagogy).

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Abstract

The purpose of this synthesis was to identify the effects socioeconomic status (SES), Physical activity (PA), and nutrition have on the youth. Despite the known benefits of being physically active and eating healthier food options, fewer than half of the U.S. school aged children meet national recommendations of 60 minutes of daily PA and one third fewer meet recommendations for fruit and vegetable consumption (Donnelly & Springer, 2015). This synthesis examined literature and articles which primarily focused on how low SES youth are effected by their communities differently than youth who reside in high SES communities. The following four questions were answered: (1) how is SES related to health? (2) How does SES influence nutritional habits in youth? (3) How does SES influence physical activity habits in youth? And (4) what effect do intervention programs have on promoting PA and proper nutrition for youth in Low SES areas? This synthesis found that in order for the youth within low SES communities to have a future with less health complications due to obesity, schools should provide better intervention programs focused on PA & nutrition, qualified physical educators should be hired, low SES community food-stores should provide heathier food options and parental support is the key for youth to start having healthier habits.

Chapter 1: *Introduction*

Obesity is an epidemic in the United States today. It's considered to be the second leading cause of death in the United States and a major contributor to multiple diseases, including cardiovascular disease, stroke, diabetes and cancer (Fahlman, McCaughtry, Martin, & Sheen, 2010). The communities that are most affected by obesity are those considered to be low of socioeconomic status. Socioeconomic status (SES) refers to the combination of education, income, and occupation. Those from lower SES areas tend to have less education, less income and are either unemployed or employed in minimum wage jobs. Individuals from low SES communities tend to be at or below the poverty line. Another name used for communities below the poverty line are considered to be "disadvantage areas". Research indicates that minority groups, such as African Americans and Latinos often reside in communities that are "disadvantage areas". Research has shown that these groups have higher rates of heart disease, stroke and diabetes than more affluent populations (Fahlman et al., 2010). It is within these low SES or "disadvantage areas" that obesity continuously trends upwards in numbers each and every year. Two variables that compound the effects of obesity and assist in individuals from low SES suffering from obesity related health problems are the access to proper nutrition and access to areas which allow for participation in physical activities.

While obesity was once considered a condition only adults could suffer from, the number of children and youth who are being identified as being obese today is growing at alarming rates, especially in areas of low SES. This would be due to the lack of access to healthier food options and lack of opportunities for physical activity within these communities. This day in age, children have a higher chance of living their entire life obese. If childhood obesity is not treated over time, it will have long lasting effects on a child's long-term physical activity and

nutrition habits. According to research by Horowitz, Colson, Hebert, and Lancaster (2004), consumers with limited financial resources and insufficient education about nutritionally appropriate, affordable, accessible foods may find it difficult to maintain a healthy diet. The limited financial resources and insufficient education about being physically active also translates to the lack of physical activity with low SES areas as well. What this means is that individuals from low SES areas tend to eat when their body is in need of nutrition as well as when their body is not in need of nutrition. This can also be said for individuals who are within higher SES groups but at a much lower rate. There are ways to help the low SES youth to become healthier and more active. That all comes down to the interventions/programs that the communities provide to help educate on nutrition and help provide access to places which one may participate in any form physical activity.

There are many programs or interventions that have been created within low SES communities both inside and outside of school which are designed to educate high risk youth to be more physically active and consume healthier options for food. For example, in one study that provided more fruit and vegetable options, students were found to eat more than half their daily fruit and vegetable intake within the school day (Robinson-O'Brien, Brugess-Champoux, Haines, Hannan, & Neumark-Sztainer, 2010). It is great that school is a place that the youth have that provide healthier food options and access to areas to be physically active but children do not stay in school 24/7. Children/adolescents either walk, drive, are driven or take public transportation to get to and from school. They go home and eat what is provided to them by their parents. Schools are not open 24/7, 365 days a year. As much as schools try to assist in educating students, other external factors play a part in pushing the youth off the right direction. The purpose of this syntheses is to look into the effects socioeconomic status, nutrition, and physical activity have on

the youth. Each play some factor as to why the youth become obese at a young age and continue to live that way for the rest of their lives.

Purpose

The purpose of this synthesis project is to review the literature on the effect's socioeconomic status, physical activity and nutrition have on the youth.

Research Questions

1. How is SES related to health?
2. How does SES influence nutritional habits in youth?
3. How does SES influence physical activity habits youth?
4. What effect do intervention programs have on promoting physical activity and proper nutrition on youth from low SES areas?

Delimitations

1. All articles reviewed were peer-reviewed and published between the years of 2000 – 2019.
2. All research article studies were originally conducted in the United States.
3. The age range for children in this synthesis ranged from 3 – 18.
4. All articles related to socioeconomic status, physical activity levels and nutrition.

Operational Definitions

1. **Socioeconomic Status (SES)** - In the context of this paper, SES refers to High SES and Low SES. High SES areas consist of individuals whom are considered wealthy as to where Low SES refers to those living near or in poverty-stricken areas. (schools, parks, recreation centers)

2. **Physical Activity (PA)** - refers to activities youth engage in that promote bodily movement which results in energy expenditure.
3. **Nutrition** - In the context of this paper, nutrition will be the forms of foods individuals' intake on a day-to-day basis.
4. **Health factors** - These conditions which have an impact on an individual's health such as obesity, cardiovascular disease, hypertension, Type 2 Diabetes etc...

Chapter 2: *Methods*

The purpose of this chapter is to review the methods used to find literature focused on socioeconomic status, physical activity, and nutrition. All research articles found must focus on the effects socioeconomic status, physical activity and nutrition have on the youth. This chapter will define and describe the processes and procedures taken in order to collect the best research articles to answer the research questions proposed by the purpose of this synthesis.

The studies collected for this synthesis were located using the EBSCO database from The College at Brockport's Drake Library. Within the EBSCO database the following databases were searched: SPORTDiscus and Academic Search Complete. Within these two databases, a total number of 11 articles met the criteria for inclusion as part of the critical mass within this literature review. In order for an article to meet the criteria for selection in this synthesis, the article must have been published between: 2000 – 2019. This will provide the synthesis with the most current and updated information available. Additional criteria for selection included scholarly and peer reviewed articles that were full-text. Having scholarly and peer reviewed articles provides more validity within the articles and better overall quality. Other articles or sources selected as part of this literature review provided context about the topic, background information and supplemental information to complete the review. All articles and sources are appropriately cited in the reference section of this paper.

In order to gather valuable and applicable articles for this synthesis, certain keywords and phrases were used when searching the data-base. Each keyword used in the search were significant to the topics and provided relevant sources which were valuable to the literature review. Within the EBSCO database, the first keyword searched was "low socioeconomic status" that resulted in 971 hits. No articles from this search were selected. The second search consisted

of the keywords “low socioeconomic status + United States or America or usa or u.s.” which generated 253 results. Out of those 231 articles, only three articles were used for the literature review. On the third search was conducted using the keywords “low socioeconomic status + United States or america or usa or u.s. + children or adolescents or youth or child or teenager” which resulted in 91 articles. Out of the 91 articles, only four articles were used for the literature review. Lastly, the key words “Low Socioeconomic status children + United States or america or adolescents or youth or child or teenager + physical activity” resulted in 24 articles. Out of those 24 articles, four articles were selected for inclusion in the synthesis.

All articles that were selected for use in this synthesis were scholarly and peer reviewed articles that were full-text. When selecting articles for use in this synthesis it was important that each article selected had valuable information related to low socioeconomic status, physical activity, nutrition and either the positive or negative effects they had on the youth. Participants within the articles were both male and female between the grades of 3rd – 8th grade.

For this synthesis, a total number of 13 articles were used to compile data on the topic of the effect’s socioeconomic status, physical activity and nutrition have on youth. There was one journal that provided three articles and three other journals that each provided two articles for use in the literature review. The four remaining articles came from different journals that were relevant to the topic of socioeconomic status, physical activity, nutrition and the effects they have on the youth. The articles came from a variety of journals including, Journal of Nutrition Education and Behavior, Journal of General Internal Medicine, Journal of School Health, American Journal of Health Education, Academic Pediatrics, Journal of Physical Activity and Health, American Journal of Public Health, American Journal of Health Promotion. Data from each article was analyzed using the following methodologies for the studies under review. Many

of the articles had similar analyses done in order to calculate the data collected. Several research articles had done either cross sectional and multivariate (MANOVA & ANOVA) models. Two of the research articles used SAS Version 9.1 which helped to calculate food store data and fruit and vegetable (FV) intake in and out of school. Another set of articles used Behavioral risk factor Surveillance System (BRFSS). The articles used were literature reviews that compared findings from other sources that provided conclusions on the different aspects SES, nutrition, and physical activity have on the youth in disadvantaged communities.

Majority of the participants were students between the grades of 3rd – 8th grade in low SES communities and high SES communities. Throughout articles, youth participants were asked if they participated more in moderate to vigorous physical activity. Other articles focused on low – SES communities lay out to collect data on what types of stores occupied the neighborhoods most and what they provided. Some qualitative research articles had random bystanders as participants in order to record park use within both low and high SES communities. The critical mass for this synthesis is comprised of 3,472 participants. Out of the 3,472 participants, 2,788 were adults while 684 were students. 431 of the student were girls while the rest were boys (253). All participants were effected by either something related to SES, physical activity, and nutrition.

Chapter 3: *Literature Review*

The purpose of this chapter is to present a review of literature on the effect of socioeconomic status, physical activity and nutrition on the long term health of youth. Specifically, the following topics will be addressed: accessibility to physical activity, neighborhood food access, and program interventions.

Accessibility to Physical Activity

Dolash, He, Yin and Sosa (2015) researched focused on assessing, determining, examining, and identifying physical activity within parks in predominantly Hispanic and low-income neighborhoods. They studied whether renovated parks were associated with higher physical activity levels among park users than non-renovated parks. They tried to determine if the level of activity differs by various play space types, such as courts, fields, and playgrounds. They also examined reasons people frequent the park and/or are physically active in parks, and attempted to identify important and modifiable changes that could increase physical activity in the renovated parks spaces. The cross-sectional study gathered data in a diverse town that was occupied by 116,000 residents, which identified as 95% Hispanic. The data collected for this research took 1 month (November–December 2012) to collect and six parks (Palm Heights, Apache Creek, Las Palmas, Acme, Collins Garden, and Avenida) were used in order to collect data on environmental assessments of the parks, physical activity observations of park users and park user interviews (Dolash, et al 2015). In order to collect data on characteristics of park environment that might influence people to visit and use the park, **Parks and Play Spaces Environmental Audit Tool** was used. Data collectors assessed the park environment, recorded the presence of park features, and quality of each park feature as poor or average/good. In order to collect another set of data, Dolash et al (2015) used **Parks and Play Spaces Direct**

Observation Tool to collect data on the amount of P.A. that took place in the parks. This data collection focused on observing physical activity at predetermined play spaces for thirty minutes each. The energy expenditure data collected was calculated by multiplying the total number of people in the play spaces by a multiplicative constant based by their intensity: sedentary (x .051kcal), moderate (x .096 kcal), or vigorous (x .144 kcal) (Dolash, et al 2015). Another set of data collected by Dolash, et al (2015) focused on semi-structured interviews with park users who were over the age of 18 and live in the city. The interviews consisted of questions focused on elicit motivators and barriers of park use. Such questions as “How often would you say you visit the specific park?” and “What is your first impression of this park?” were asked. Fifty-five parks users were approached but only 51 (92.6%) completed the interviews (Dolash, et al 2015). Out of the 51 interviews, 33 were conducted in non-renovated parks and 18 at renovated parks.

Overall, the researchers identified four underlying themes and impressions for each park. The first theme was the motivation to be physically active. Park user's primary motivation and their motivators to be physically active was to have better health and well-being for their children. They either came to the park to play with their children or just brought their children along. This theme also translates to a second theme found, the social support for park use. As mentioned before, participants, motivation for being physically active was due to children. According to Dolash, et al (2015) grandchildren, nieces, nephews and participants own children are under the category of “children”. The third theme found was the use of play spaces within the parks. Play spaces were used more frequently than other areas of the park. Such play spaces as basketball courts, park trails (running/walking) and playgrounds were the areas of play spaces. The fourth theme found was if parks were the main place where participants went to be physically active. The researchers found that 39% of park users used the parks as their main

source for being physically active. Another 59% used others park on the Westside of San Antonio, Texas as their main place for PA. Remaining participant's source to be physically active was at a gym or YMCA only because of the option to weightlift.

As for park impressions, parks were liked by interviewees due to cleanliness, friendliness, renovations, open space, and that people used the park. As for perk improvements, interviewees informed researchers that parks need amenities such as water fountains with cold water, extra parking spots, picnics tables, more lighting, smaller climbing equipment and overall equipment for children including toddler swings. As for the Safety Across parks, Collins Garden and Palm Heights were praised for police presence and feeling safe. Avenida Park was perceived as safe, but users didn't like that people who drank alcohol would hang in the park. Apache Creek was a different feeling because users felt safe due to lack of violence and no strangers hanging around. Las Palmas park user only felt safe at the park during the day and Acme park users want more police presence because they did not like people hanging around and felt it made the park somewhat unsafe (Dolash, et al 2015).

Further research focused on physical activity in low SES communities done by Powell, Slater, Chaloupka, and Harper (2006) aimed to determine why adults do not engage in PA. They noted that because 50% of adults do not engage in enough physical activity to meet public health recommendations and that 26% report no leisure-time physical activity. American youth do not participate in enough vigorous or moderate exercise. Research indicates that 33.4% of high-school students do not engage in either enough vigorous (at least 20 min on 3 or more of the past 7 days) physical activity or enough moderate (at least 30 min on 5 or more of the past 7 days) physical activity. Patterns of physical activity are not equitable according to race, ethnicity, or SES. Included among adult populations most at risk for leisure-time inactivity, are those at low

levels of income and education, those living in poverty, those who are members of racial/ethnic minorities groups, and those with disabilities.

In this study, the researchers examined 4 broad types of physical activity: 1.) Physical fitness facilities, 2.) membership sports and recreation clubs, 3.) dance studios, schools and halls, and 4.) public golf courses. All the commercial outlet data collected were linked by using a zip code to US Census Bureau population and SES data. A total of 28050 zip code areas were identified in order to find information on areas total population, race, ethnicity and median household income. For this research, Powell, et al, (2006) assessed “Race” according to percentages of residents in zip code areas classified in the categories of White, African American, Asian, or “other”. “Ethnicity” was assessed to the percentage of Hispanic vs non-Hispanic residents in a zip code area. Other categories created by using the U.S. Census data for this research was the four definitions under the term urbanization: 1) urban (urbanized area), 2) suburban (urban cluster), 3) rural (rural non-farm), and 4) farm (rural farm). This allowed the researchers to look into areas within the South, West, Midwest, and Northeast of the U.S.

Related outlets were obtained through a software program named Marketplace created by Dun and Bradstreet, Inc. Marketplace is a software program that contains information on more than 14 million businesses in the United States and the company compiles and updates records quarterly through interviews, public documents, and directories. Powell, et al (2006) also used Standard Industry Classification (SIC) codes to search and select specific types of businesses that are on a primary list in order to eliminate duplication of businesses. Using Marketplace and SIC codes allowed the researchers to find businesses in four categories: 1) physical fitness facilities (primarily health clubs, spas, and similar facilities featuring exercise classes), 2) membership sports and recreation clubs (sport and membership clubs restricted to members and their guests,

such as country, golf, tennis, yacht and amateur sports and recreation clubs), 3) dance studios, schools, and halls (including public dance halls and ballrooms), and 4) public golf courses (open to the public on a contract or fee basis).

Through analysis of the data, Powell, et al (2006) concluded that barriers to commercial facilities exist in low-SES neighborhoods and those with higher proportions of African-American residents and resident of other minority racial backgrounds. The reduced prevalence observed in communities with higher proportions of African-American, Hispanics, and residents of other racial backgrounds were relatively smaller in terms of membership to sport and recreation clubs relative to other three types of facilities. They further found that each type of facility was significantly more likely to be in suburban communities than urban. They noted that moving from a community in which all residents were African Americans to a community in which all residents were white showed that the likelihood of a least one physical fitness facility or public golf course being available was 5 fold, the likelihood of at least one dance facility being available would increase 7-fold, and the likelihood of at least one membership sports and recreation club being available would increase by 58% (Powell, et al 2006). As for Hispanic communities composed of 50+%, research found that non-Hispanic neighborhoods more than likely will have a physical fitness facility (172%), membership sports or recreation club (45%), dance facility (77%), and a public golf course (93%) available (Powell, et al 2006).

In addition to the disparity in community resources Oh, Hennessy, McSpadden, and Perna (2015) examined two national databases in order to find a relationship between state laws for physical education and neighborhood amenities for physical activity on the weight status of adolescents of low SES. The two databases used were Classification of Laws Associated with School Students (CLASS) and the National Survey of Children's Health (NSCH). NSCH

gathered data via a telephone survey for children between the ages of 0 to 17 and CLASS was used to gather data on PE laws from each of the 50 states and District of Columbia. The PE laws codified by CLASS and the combination of NSCH allowed children to be national representatives and representatives of the state from which they were sampled.

The data was merged together from CLASS (2005) and NSCH (2007). CLASS 2005 data was used to allow for a minimum one-year lag time, from coded law to enactment and implementation. Inclusion criteria for analyses were NSCH respondents between the ages of 0 to 14 that reported attending public school. Respondents who did not report from the analyses, because neighborhood amenities are correlated with SES and the specific nature of our research question, the sample for analysis included 1,895 adolescents of low SES who were below the Federal Poverty Level (FPL).

Oh, et al (2015) concluded that greater neighborhood amenities at the local level lowered adolescent's odds of being obese and remained significant, whereas the presence of PE laws was not significant. The presences of local amenities for PA are more proximal than state PE laws and may complement and enhance adolescent's activity and practice of skills learned in PE. However, the higher odds of overweight youth associated more specifically with greater neighborhood amenities. They suggest there may be other neighborhood factors correlated with walkability that may promote overweight such as greater access to shops, stores, and restaurants that may sell sugary and salty snacks and meals.

Neighborhood Food Access

A research done by Brown, Vargas, Ang, and Pebley (2008) focused on examining the associations between the neighborhood food resource environment and health status for adults with and without, a chronic disease. The reason as to why Brown, et al (2008) focused on this

association is due to the how influential local food environment is towards individuals with or without chronic conditions. Within low-income communities, residents purchase foods in stores that stock fewer healthy options but at higher prices than those who live in more advantaged areas.

The researchers used data from L.A. FANS Wave 1, which is a longitudinal study of families in stratified probability sample of census tracts in Los Angeles County (2000-01). Briefly, 1652 census tracts in Los Angeles County were stratified based on the proportion of residents with annual income below the poverty level (referred to here as very deprived, deprived, and not deprived). In a representative sample of 65 tracts (20 very deprived, 20 deprived, and 25 not deprived), 40-50 dwelling units were sampled at random, with an oversample of households with children. Within each household, L.A. FANS randomly sampled 1 adult who was interviewed in person. These analyses include data only from the randomly sampled adults in the L.A. FANS Wave 1 cohort.

The researchers had two variables which changed how the data was going to be collected. The first variable was the Neighborhood Level variable which focused on the number of food stores per roadway miles in the census tract. Food stores in L.A. County were identified using commercial data obtained through InfoUSA from 1999 and 2000 and categorized using the 2000 North American Industry Classification System (NAICS) codes, the Food Marketing Institute (FMI) definitions of food retail stores, and review of store names. Stores were categorized as supermarkets, small local markets, and convenience stores by using the methods described earlier in the paragraph. Supermarkets were further categorized into large chain stores and independent or ethnic supermarkets in L.A. County. Roadway miles in a census tract were obtained from the 2000 U.S. Census and neighborhood deprivation was assessed using each

tract's SES Index. The SES Index is data collection of the five census tract variables that represent education, income, wealth, occupational status and employment. The second variable that Brown, et al (2008) focused on was the individual level variable. This variable focused on the chronic conditions which individuals may suffer from, such as hypertension, diabetes, or a chronic lung problem (asthma, chronic bronchitis, or chronic obstructive pulmonary disease. Age, sex, race/ethnicity, income, education, smoking, and alcohol use were also measured at the individual level. The dependent variables were self-related health and self-reported BMI. Self-related health was measured with questions like "how would you rate your overall health?". Responses to questions above or similar were answered with either options of poor, fair, good, very good, or excellent.

Brown, et al (2008) research found that both greater accessibility to and shopping in large, chain supermarkets were associated with better self-rated health and trends toward lower BMI. Yet, study participants with a chronic condition benefited less than those without a chronic condition from living in an area with a high concentration of supermarkets. They also appeared to be more adversely affected when they lived in areas with a high concentration of convenience stores.

Since the majority of studies have shown the correlations between neighborhood food stores and the risk of obesity in adults, fewer studies have been focused on the impact that it has on children. Research done by Galvez, Hong, Choi, Liao, Godbold, and Brenner (2009) investigated the relationship between the urban food environment of East Harlem, NY and body size of minority children living there. More specifically, Galvez, et al (2009) wanted to explore the relationship between convenience stores and fast-food restaurants since both are potential sources of high fat and calorie-dense foods that aid in the risk of childhood obesity.

The researchers used baseline data from a three-year longitudinal study of six to eight-year-old East Harlem boys and girls. The children were recruited as a per an institutional review board-approved protocol from the Mount Sinai Pediatrics Practice, East Harlem community health centers, community-based organizations, and East Harlem schools. Only boys and girls who were residents of East Harlem who spoke English or Spanish were eligible to be participants. Any children who had medical conditions involving endocrine system disorders or other medical conditions that are related to obesity were considered ineligible. Standard protocol was used for collecting height and weight of participants. Age and sex-specific BMI percentiles based on the 2000 Centers for Disease Control and Prevention growth charts for the United States. East Harlem food-store data (convenience stores, specialty stores, grocery stores, supermarket, fast-food restaurants, & restaurants) were collected via a comprehensive walking survey of East Harlem zip codes 10029 and 10035 in 2004 (Galvez, et al 2009). Food stores were classified as per the North American Industry Classification System. Stores with the same census block as the child's home address were identified using ArcGIS software version 8.3, which allowed geocoding on both home and store address. Food stores and restaurants were measured as individual counts. The models used were run separately for each type of restaurant.

The results from Galvez, et al (2009) research concluded that in inner-city, minority community of East Harlem, New York, presence of convenience stores on the block in which a child resides is associated with increased risk for childhood obesity as measured by BMI. Three hundred twenty-three children aged six to eight years of age enrolled in the study with an even distribution among six-year-olds (37%), seven-year-olds (31%), and eight-years-old (32%) children. Seventy-one percent of participants were female and 61% for overall study participants were Hispanic. Majority of household incomes (91%) were less than \$49,999, and of those 60%

had incomes less than \$24,999, which is well below the poverty line of \$35,600 for a family of 8. Of the participants included within this study, 40% of girls and 50% of boys had BMI's above norm of the Center for Disease Control and Prevention. Convenience stores were present in 55% of the census blocks which participants lived. Fast-food restaurants were present in 41% of census blocks Sixty-six percent of the 323 children lived in census blocks with no specialty stores, grocery stores, or restaurants. However, children living on a block with 1 or more convenience stores were more likely to have a BMI percentile in the top tertile, than children living on a block with no convenience stores on their block of residence.

Poor Dietary intake, including inadequate fruit and vegetable consumption, has been associated with an increase in the risk of developing several chronic diseases. Therefore, intervening during childhood may be critical to reducing the risk of obesity. Many of the contemporary interventions designed to prevent obesity through healthy food choices have focused on changes in knowledge and attitudes. The purpose of Mushi-Brunt, Haire-Joshu, Elliott, & Brownson, (2007) research was to examine the relationships between grocery store availability, accessibility, parent-reported fruit and vegetable intake, and weight status among the children participating in an obesity prevention program. The study was guided by three research questions: 1.) Are there sociodemographic differences in fruit and vegetable intake and weight status (BMI) among the pre-adolescent children in the study? 2.) Are there differences in the distribution of grocery stores within the study area? and 3.) Are neighborhood sociodemographic factors, child fruit and vegetable intake, and child weight status associated with the availability and accessibility of grocery stores?

Mushi-Brunt, et al (2007) data was collected by using baseline data from the Partners of All Ages Reading about Diet and Exercise (PARADE) study were used to analysis. The

multiyear intervention study was conducted between 2000 and 2004 in a large metropolitan area in Midwestern United States. The study was designed to encourage at-risk preadolescent children (ages 6 to 11) to develop healthy eating and physical activity patterns. The research team collaborated with three tutoring/mentoring community agencies serving “at-risk” children. This specific population was selected because research suggests such children are the greater risk of overweight (Mush-Brunt, et al 2007). The study was conducted in three waves, with Waves I and III taking place in two different school years (eight months) and Wave II was taken over the summer (three months) to test the streamline of the intervention.

After receiving parental consent, child participant data was collected by community agencies and focused on gathering data on the children’s height (wall-mounted stadiometer) and weight (calibrated digital scale). Weight status was identified by BMI, BMI z-scores and was calculated using the Centers for Disease Control and Prevention Growth Charts. The reason why BMI z-scores were used because age and gender difference are more accurate among different groups compared to BMI. Parent data was collected by conducting surveys focused on gathering information on parent and child demographic characteristics and fruit and vegetable intake (FV). Demographics for the study included age, gender, race, and household income. The only ethnicities which data was collected for this study were only African-Americans and Whites. Household income was categorized from a range of less than \$15,000 to greater than \$50,000. As for FV intake, this data was collected by conducting a 28-item food frequency questionnaire that was geographically relevant to the study population. Parents were given the survey and had to report on a scale from none to seven or more times a week, that they or their children had consumed any form of FV through the previous week. To assess daily recommended adherence, the variable was separated into meeting and not meeting the recommended amount of FV intake

(at least 5 servings per day). Local food environment was collected by using the North American Industry Classification System code number. This assisted in classifying all local supermarkets and grocery stores by obtaining them from several sources, local chamber of commerce, telephone registries, and grocery store websites. The last set of data Mushi-Brunt, et al (2007) collected for this research was to identify neighborhood characteristics. The researchers gathered this data by using the 2000 Census Bureau's Summary File 3. The census tract allowed Mushi-Brunt, et al (2007) to characterize low poverty neighborhoods as less than 10% of the population living below the federal poverty line and high poverty neighborhoods with 10% or more of the population living below the federal poverty line.

At the conclusion of Mushi-Brunt et al (2007) research, they concluded that there was some association between the neighborhood characteristics, grocery store availability, and child FV intake. On an individual level, there were correlations between gender, race, and weight status. This correlation was mostly seen in the girls who were participants. African-American girls (54%) were overweight by 28% compared to white girls (26%) even with the controlling of household income. The researchers found that the odds of being overweight were two times greater for African-American children than for white, 1.9 times greater for females than males, and three times greater for African-American females than all other race and gender combinations. 51% of neighborhoods with more than 10% of the population below poverty had no grocery stores within the census tract, whereas only 24.2% of low poverty neighborhoods had no grocery stores within the census tract (Mushi-Brunt, et al 2007). 57% of children in the study lived less than one mile from the nearest grocery store to their home. When controlling for income, it was found that 60.3% of low-income children living less than one mile from a grocery store were normal weight compared to 58.2% of those who lived further than one mile.

Furthermore, 58.5% of high-income children living less than one mile from a grocery store were normal weight compared to 64% of those living farther away. Nearly 63% of children in the study lived in neighborhoods classified as high poverty. When focused on FV intake, children in low poverty neighborhoods ate more servings of FV. 78% of children failed to meet daily fruit and vegetable recommendations, and nearly 37% of children were at risk of being overweight or are overweight.

Outside of adults and children consuming calories through food, beverage consumption also enhances the chances of obesity at a young age. Researchers have identified that sweet and beverage consumption is a contributor to weight gain and play a factor in children having weight management problems. Research done by Goodell, Pierce, Amico, & Ferris, (2012) focused on evaluating the Information-Motivation-behavioral Skills (IMB) model for its potential utility in characterizing children's sweet and beverage (SB) consumption in a cross-sectional design in a sample of ethnic minority parents of lower SES. The IMB model is a health behavior model which examines the parental factors influencing their preschool children SB consumption. The IMB model has three core constructs which focus on information (facts, heuristics, implicit theories), motivation (personal & social), and behavioral skills (ability & self-efficacy in implementing those skills in various situations). The IMB model's information allows the researchers to gather critical parental information on the effects of SB overconsumption, what recommended exposure is, and if they know any viable alternatives available or recommended. When it came to personal motivation, the focus would be on parent attitudes and beliefs about the positive and negative consequences to both themselves and their children of allowing overconsumption and for implementing restrictions on their child's consumption. As for social motivation, it would include beliefs and attitudes of other people of importance to the parent and

child about a child's beverage choices, as well as perceived negative consequences of implementing restrictions on such choices. The third constructs which focus on skill would be identified as important to consumption may include parents' specific abilities to negotiate the child's exposure to various kinds of beverages across diverse situations and parent's confidence in implementing these skills.

In order to gather the data needed for this research, Goodell, et al (2012) used an interviewer-administered IMB survey and self-reported Home Beverage Inventory (HBI) with a convenience sample of English-speaking parent of young children. With help from two Hartford, Connecticut Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and local health fairs who serve low – SES populations, 266 parents enrolled in the study to be orally interviewed for 20 minutes and take the IMB survey. Out of the 266 initial participants, 198 participants (74%) completed both the IMB survey and HBI for Goodell, et al (2012) study. In order to be included in Goodell, et al (2012) study, participants had to be the parent or legal guardian of a one to five-year-old (not in kindergarten). If one or more child's in the family fit the criteria, parents only answered regarding the oldest.

Goodell, et al (2012) measured the data collected by developing an IMB based SB consumption survey targeting the parental constructs related to children's SB consumption. The survey items were intended to sample across diverse aspects of information but since it demonstrated low internal consistency within each index, the data collection had to be structured with a measured variable approach in order to correctly analyze the data. The SB constructs were assessed in different ways: five items for information, two for personal information, two for social motivation, and several for behavioral skills. Higher scores reflected higher amounts of accurate information, higher amounts of total motivation, and higher levels of behavioral skills.

When measuring with the HBI, parents had to measure their child's typical serving size using four differently sized color cups. Participants listed all non-alcoholic beverages in the house and reported the beverages brand, type, flavor, size, container, and the number of containers for each drink. Parents also estimated how often their child drank each listed beverage and how much they drank at one-time following a beverage frequency methodology. After this information was gathered by researchers from the parent participants, the researchers asked two follow up questions in order to gather further information on if the child drink a specific SB every day, week, month, or year and the number of times their child drinks a certain SB (day, week, month, or year). Once this was collected from the HBI, each beverage was inputted into Nutritionist Pro Diet Analysis software. Beverage serving sizes were estimated by calculating the beverages consumed on a daily basis. Goodell, et al (2012) then calculated average daily calories consumed from SB. The total daily calories sums were put into 4 SB categories: juice drinks and juice-flavored beverages, flavored milk, hot beverages, and soda). This allowed the researchers to create a measure of average daily calories consumed by SB.

With primarily of participants being of ethnic minority backgrounds and of lower SES, Goodell, et al (2012) research conclude that greater parental information about SB consumption was related to greater skills in regulating SB consumption exposure; it was also directly related to fewer calories consumed by children. This means that nutrition education and improving parental knowledge may lower SB consumption because out of all participants, one-quarter of the parents did not have a high school diploma and about half had a high school or general equivalency diploma. Goodell, et al (2012) research also found an even stronger relationship between information and SB consumption when behavioral skills were involved. What this means is that if a parent can learn to buy 100% juice by looking at the nutrition facts label, there

is a possibility that SB consumption will decrease. When incorporating motivation as well, SB consumption by parents related to greater behavioral skills and those skills were directly related to lower SB consumption in their children as well.

Donnelly and Springer (2015) study examined levels of child-reported parents and family social support, for PA and FVC by ethnicity, family income, and parent education level among elementary school-aged children in central Texas as well as the association of child-reported social support with PA (running), FVC, and child weight status among 3 ethnic groups (Hispanic, African American and white children) and among higher and lower income SES children. The researcher conducted an analysis of cross-sectional baseline data from the Active Kids-Healthy Kids project, which is an evaluation study of the school and community-based Marathon Kids aim to promote running and walking and FVC in elementary school children. Study participants were 581 fourth and fifth-grade students and their parents attending 19 low income public elementary schools located in a large urban school district in Central Texas. The represented ethnicity for this research taken from Central Texas sampled 85.7% Hispanic, 7.2% African-American, 5.9% White and 89.4% of the collected data were economically disadvantaged.

The researchers collected data via a self-administered survey with students and their parents in the fall of 2010. Parent data was collected by sending a letter of invitation, an informed parental consent form and a parent questionnaire home with students. Once consent was obtained, students and parents had the option to complete the survey in English or Spanish. Majority of completed surveys were done in English with parents having chosen English 52.1% and 80.4% for students. Among the 747 students, 581 completed student and parent survey making a response rate of 67.1%. The survey completed by both child and parent participants

included measures focused on sociodemographic characteristics, FVC, PA, and psychosocial-related constructs. The data focused on parent and family social support, PA, FVC, gender, age, and child ethnicity were reported by and collected from child participants, while parent ethnicity, family income, and parent education came from the parent participants.

The researchers collected the child reported social support for PA by adapting from Amherst Health and Activity Study and the Athletic Identify Questionnaire for Children. The child participants completed 6 questions to assess their social support for PA through a 5-point ranging scale going to least (never) to greatest (always). The child reported social support measures for healthy eating were adapted from the Family Influence scale which allowed participants to completed 4 items on social support for FVC on the same 5-point scale from never to always. All of the questions from the child reported social support for PA and FVC was combined to create the “combined child reported social support”. The researchers composed scores for child-related social support of PA ranges from 6 (least support) to 30 (high support). Scores for child reported social support of healthy eating ranged from 4-20 and combined child reported social support from 10 to 50. PA was assessed using a running item from the Physical Activity Questionnaire for Older Children. This is a 7-day recall measure designed to assess general PA levels in children in grades 4 and higher. The researchers focused specifically on past 7-day running because the behavior was a primary target of the Marathon Kids program. When collecting data on FVC, the researchers used two items to assess the data. The assessment was adapted from the School Physical Activity and Nutrition (SPAN) survey. The SPAN survey asked students how many times they ate fruit (or vegetables) on the previous day with a response of 0, 1, 2, and ≥ 3 times. Weight status was measured by collecting height through a portable stadiometer and weight from a digital scale. BMI (height, weight, age, gender) was used to

categorize whether participants classified as underweight, normal, overweight, and obese. Overweight was classified as 85th to \leq 95th percentile; obese was classified as the \geq 95th percentile. Parent income data was collected by participant's marking their total household income per month from a list of 6 options that ranged from $<$ \$1,000/month to \geq \$5,000/month. Parent education was gathered by parents marking the highest level of education among all adults in household by choosing from a list of six options that ranged from eighth grade or lower; some high school but did not graduate; high school graduate or graduate equivalency diploma; some college or 2-year degree; 4-year college graduate; and $>$ 4-year college degree. Ethnicity data was only gathered from students and they had to choose from a list of 7 options. The researchers specifically wanted to focus on the 3 largest ethnic groups which are African-American, Mexican American or Hispanic; and white, non-Hispanic. The option to choose "other" was provided just in case students described themselves as American Indian, Asian, Native Hawaiian/Pacific Islanders, or other.

Donnelly and Springer (2015) research found significant differences in social support by ethnicity, income and child gender. Hispanic children and children from lower-income households reported the lowest levels of social support for PA and FVC. Hispanic children reported lower mean social support score in PA compared with African Americans children. The data also found that White children reported significantly higher mean social support scores for FVC compared to African Americans, Hispanic, and "other" children. They also found that child-reported social support was positively related to child engagement in 3 energy balance-related health behaviors examined (PA, F&V consumption) for total sample across ethnic groups of Hispanic, African-American, and White children and for the lowest income children. Children in households with a monthly income of \$0-\$999 reported significantly lower mean social

support for FVC compared with children in households with a monthly income of \geq \$5,000.

Children with parents who made $<$ \$1,000/month and who reported exercising $<$ 7 times/week had significantly higher levels of social support than those who exercise 1-2 times.

Program Interventions

Despite evidence in support of the health benefits that come with the intake of Fruit and Vegetables (FV), national data have indicated that FV consumption among school-aged children is below the recommended levels in low SES communities. Schools meals offered through interventions programs such as the School Breakfast Program and National School Lunch Program can provide contributions to FV intake in children from low SES communities. In order to examine if intervention programs can provide the contributions mentioned above, Robinson-O'Brien, et al (2010) conducted a study to examine associations between child daily FV intake and location of eating occasion (school vs non-school) in a sampled of ethnically diverse, low SES, fourth to sixth-grade students. Four research questions were addressed with the study: (1) what is the total daily FV intake in this population; (2) What proportion of the daily FV intake is consumed at school; (3) Does FV intake differ by gender, race, age, or weight status?, and (4) What role do school meals play in contributing to FV intake among those with the lowest FV intake?

In order to collect the necessary data, Robinson-O'Brien, et al (2010) focus population for the study was 103 children (78 females, 25 males) from 4 urban elementary schools (fourth to sixth grade) in St. Paul Minnesota that primarily serve low income populations who participated in an evaluation of the Ready. Set. ACTION (RSA) program intervention for obesity prevention. Ninety percent of students at each school qualify for free-reduced school lunch. Of the 103 participants in the research, 102 ate the school lunch provided by the NSLP while 61 students'

participants focused the school breakfast. The mean age for the student participants were 10.5 and 10.2 years of age. Student participant's ethnicity for the research was 55% African-American, 12% Asian/Hmong, 8% White, 3% Hispanic, and 24% mixed/other. Written consent was received by student participants parents or primary caregiver and a sizable proportion of the participants were overweight (56% male, 36% female) with a BMI of >85th percentile for age and gender.

The dietary intake was assessed using a 1-day 24-hour dietary recall collected by research staff using nutrition Data System for Research (NDS-R, 2006) on Tuesday through Friday to ensure that only weekday eating patterns were recorded. Dietary recalls were utilized to obtain a record of the type and number of foods and beverages consumed by participants during a complete 24-hour period (from midnight to midnight) for the day preceding the interview. Dietary interviewers, who were trained by the Nutrition Coordinating Center (NCC), used NDS-R dietary collection computer software to obtain 24-hour dietary recall for participants face to face interviews utilizing a standardized multiple-pass approach in which NDS-R displays computer prompts to assist interviewers in following a consistent, systematic approach. Interviews were conducted during the school day and took 30-45 minutes to complete. Participants were shown standardized food portion models to assist in estimating amounts of food consumed. Servings of fruits, vegetables, and total fruits and vegetables were calculated using the food group serving count systems based on the 2005 Dietary Guidelines for Americans. The researchers measured fruit and vegetable intake through Dietary Guidelines for Americans (2005). The dietary guidelines for fruit intake were: 1 medium apple, banana, orange, or a pear; a ½ cup of chopped, cooked, or canned fruit; ¼ cup of dried fruit or a ½ cup of fruit juice. Fruit servings included fruit and juice consumed separately (plain) and in a fruit salad but did not

include fried fruit. Vegetable intake guidelines were: 1 cup of raw leafy vegetables, ½ cup of other cooked or raw vegetables, or a ½ cup of vegetable juice. The vegetable servings included vegetables and vegetables juice consumed separately (plain) and in recipes containing vegetables, egg, stew, soup, lasagna, pizza, salad, casseroles, and commercial entrees, but did not include fried vegetables. Participant's height and weight were measured for the BMI portion of the study and the age and sex-specific BMI z-scores were calculated through the Centers for Disease control and prevention growth charts.

Robinson-O'Brien, et al (2010) research concluded that the school meals program provided an important contribution to overall daily FV intake. Children consumed over half of their daily FV intake within school (54%). Daily FV intake among males (3.0 servings) was lower than FV intake among females (3.7 servings). The observed proportion of daily FV consumed at school among males was 64%, while females were 51%. Of the 103 participants, 82 consumed fewer than 5 daily servings of FV. When compared to children with higher FV intake (>5 FV servings daily), children with lower FV intake (<5 FV servings daily) consumed a higher proportion of their daily intake at school (34% vs 59%).

Outside of just intervention programs being focused on children having better nutrition support within schools, they also provide intervention programs for students to be more physically active. Not many studies have focused on the PA policies and practices for children during school, but they have found that schools in low SES areas are less likely to offer recess and provide fewer PA supportive practices than of those in high SES areas. In order to look further into this, by Carlson, Mignano, Norman, McKenzie, Kerr, Arredondo, & Sallis (2014) focused on adding to the limited evidence by investigating the association of school SES to 15 existing school physical activity practices related to PE, recess, classroom, and after-school time,

as well as children's objectively measured MVPA during school. Schools were also classified, based on the practices they implemented, and SES was investigated as a possible explanatory factor of the classification.

Data for this study was gathered using two larger studies focused on observing neighborhood environments and children's PA, and a community-based obesity prevention intervention. The observational study is named Neighborhood Impact on Kids (NIK) and it allowed the recruitment of children from neighborhoods. The community-based obesity prevention intervention called MOVE allowed for recruitment around recreation centers. Elementary schools in Seattle/King County, Washington, and San Diego County, California, metropolitan areas were included in the study if they had a child enrolled in NIK or MOVE in 2009-2010. School PA practices were measured by survey item selection from the School Physical Activity Policy Assessment (SPAPA). The survey consisted of 15 practices covering in-school time, including PE, recess, and classroom time, as well as practices covering after-school time. School Demographic Characteristics data was gathered by identifying the students eligible for free or reduced-price lunch (FRPL) and dividing the data into three groups representing low SES (41% to 100%), moderate SES (13.1% to 40%), and high SES (0% to 13.1%). Children's PA was assessed by accelerometers: Actigraph model GTIM (91%) and model 7164 (8%) over the course of 7 days (Carlson, et al 2014). Daily minutes of MVPA were calculated using the 4-metabolic equivalent of task (4-MET) Freedson age-based thresholds.

Carlson, et al (2014) research found that SES disparities in some school practices related to PA, with the most important finding being that high – SES schools were much more likely to have a PE teacher than were low – SES schools. The finding that low – SES schools without a PE teacher were still providing some, albeit fewer, opportunities for PA suggest that most of the

obligation of providing PE and PA opportunities was fulfilled by classroom teachers. However, children at low – SES schools' had 5 fewer minutes per day of MVPA than high-SES schools. The finding from this research shows that PE teachers play a critical role in children's PA and the need for national policies and funding to support hiring PE teachers.

The third study for this chapter done by Taber, Chriqui, Powell, Perna, Robinson, & Chaloupka (2015) designed a comprehensive assessment of socioeconomic differences in: 1.) the school food laws and beverage environment, and (2) the association between state competitive food laws and the school food/beverage environment. Using the data from 40 states, Taber, et al (2015) analyzed index measure of the overall school environment, as well as data on the availability of specific food/beverage groups, including both healthy and unhealthy options, within a school. This would allow the researcher to find out if the school offered fewer unhealthy items or offer more healthy items and whether adherence methods or the school food environment, in general, differed in high versus low-income areas.

The researchers linked 5th-grade and 8th-grade data from the Early Childhood Longitudinal Study-Kindergarten Class (ECLS-K, 1998) with state law data from the National Cancer Institute's Classification of Laws Associated with School Students (CLASS). Schools were classified into tertiles of SES (low, medium, high) and median household income was used to measure SES (2000 U.S. Census). The 5th and 8th-grade student participant's data was from public schools that conducted the ECLS-K in the spring of 2004 and 2007. CLASS provided the researchers with a database to that rates stated codded laws regarding nutrition standards for competitive food and beverages. Six categories of the law that govern the nutrition content of food sold in vending machines, cafeterias, school stores, and other venues.

Taber, et al (2015) research concluded that high SES schools sold more items of healthy and unhealthy foods in both grade levels and the distribution of overall law categories (none, weak, strong) of baked goods were more likely to be sold in high versus low SES schools, regardless of whether the baked goods were low-fat or not. In 8th grade, differences in unhealthy items tended to be smaller than they were in 5th grade. In both grades, medium SES schools also tended to sell more of all food/beverages than low-SES schools. When focused on the association between strong competitive food/beverage laws and index measures, strong laws were not associated with the 5th graders and these associations didn't vary by school SES. When it came to the 8th grade, states with strong laws tended to have higher Healthy School Food Environment Index (HSFEI) and Healthy School Overall Environment Index (HSOEI) scores regardless of school SES. Taber, et al (2015) also found evidence that competitive beverage laws had a stronger association with Healthy School Beverage Environment Index (HSBEI) scores in low-SES schools compared to medium or high-SES schools in 8th grade. Even though strong laws have helped in eliminating unhealthy limited nutritional value food options within schools, they still do not replace them with healthier items such as fruits, vegetables and low-fat snacks (Taber, et al 2015).

Summary

The purpose of this chapter was to present a review of literature on the effects socioeconomic status, physical activity, and nutrition have on the youth. The first objective was to review the literature on how the differences of health are between both low – SES communities and high – SES communities. Once that objective was complete, the next step was to review the literature on how low – SES communities are different when it comes to PA access, nutrition habits and possible interventions programs. After completing research on the effects

SES, PA, and nutrition have on the youth, it is concluded that in order for the youth within low – SES communities to have a future without any obesity-related health complications, schools must provide better intervention programs focused on PA & nutrition, schools must hire qualified physical educators, low – SES community food-stores should provide healthier food options, low – SES communities must provide more PA facilitates besides parks and parental support is the key for the youth to obtain healthy habits.

Chapter 4: *Discussion, Recommendation for Future Research*

The effect socioeconomic status, physical activity and nutrition have on the youth was reviewed in this synthesis project. The research question focused on how SES effects health, how SES effects PA & nutrition, and the effects intervention programs have in promoting PA and proper nutrition in low – SES communities. Based on the review of literature, there were several conclusions that played a part in the why low –SES youth are more effected by obesity through there entire lives compared to high – SES youth. There was significant evidence showing that lack of education, neighborhood design, park/facility access, and lack of healthy food options play apart in aiding childhood obesity within low –SES communities.

Discussion

A total of 11 articles were used to examine the effects SES, PA, and nutrition have on the youth. After completing research on the effects SES, PA, and nutrition have on the youth, it is concluded that in order for the youth within low – SES communities to have a future without any obesity related health complications, parents, schools and the surrounding community all play a factors in providing the opportunity for the youth to be more aware of their health. Schools must provide better intervention programs focused on PA & nutrition. Hiring a qualified physical educator and providing after school programs can assist in the youth having a place that provides an opportunity to be active physically. Even helping in promoting other after school programs or centers can be of help as well. Educating the youth within school about proper nutrition and providing healthier food options can assist in helping create healthy habits for the youth. Outside of schools, food stores can provide healthier snacks and food options to assist what is being learn within school. The last but most important assistance that is needed in order for the youth to live

a healthier life and gain healthy habits is by having parental support. Majority of what the youth does is follow. So if parents decided to be active and eat healthy, then the kid's will follow and learn from their primary care taker, and the secondary care taker (school) will assist which will create the healthy habits the youth needs within low – SES communities.

Recommendations for Future Research

The review of literature and the research done for this synthesis resulted in many conclusion but it also came with suggestions for further research. Future research would be related to focusing on SES, PA and nutrition and there effect on the youth. While research has provided details and offered knowledge into the topics, more research needs to be conducted in order to further analyze possible outcomes that can be similar to past research or discover something new.

The first recommendation would be to conduct further research focused on socioeconomic differences pertaining to PE and nutrition policies. Depending on who is leading a committee policies can change through time. To be able to view and see if policies are assisting in creating obese youth instead of belong to become healthier should be focused on more. It will allow individuals to see what does is working or hurting the cause. A second recommendation would be to examine the relationship between renovated parks and none renovated parks. As for renovated parks, they will most likely bring in people whom don't usually go to parks for multiple different reasons. Some none park users may be open to seeing what a new renovated park consist of especially if they had an opinion on what the park should have, such as basketball courts, swings or just the overall new design of a playground. A third recommendation would be to have further research focused on child dietary behavior across all racial / ethnic groups, socioeconomic demographics and geographic areas, including urban, suburban, and rural setting

in order to explain children daily travel, purchasing and consumption patterns in relationship to the local food environment (Galvez, et al 2009). Other factors would include what type of foods are available in stores and how they are displayed, advertised and priced.

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**Appendix A:
Article Grid**

| Author | Title | Source | Purpose | Methods & Procedures | Analysis | Findings | Recommendations |
|--|--|--------------------------------------|--|---|---|---|---|
| Robinson-O'Brien, R., Burgess-Champoux, T., Haines, J., Hannan, P. J., & Neumark-Sztainer, D. (2010) | Associations Between School Meals Offered Through the National School Breakfast Program and the Vegetable Intake Among Ethnically Diverse, Low-Income Children | Journal of School Health | The aim for this study is to examine the associations between daily fruit and Vegetable (FV) intake and the location of eating occasion (School vs non-school) in ethnically diverse, low socioeconomic areas. | 103 children (78 females, 25 males) in the fourth to fifth grade (ages 9-12) from four urban elementary schools | SAS Version 9.1 (SAS Institute, Inc., Cary, NC) | 80% of children consumed fewer than five daily servings of FV. On average, children consumed over half of their daily FV intake within school. Children with low FV intake consumed a higher proportion of their daily intake at school than children with higher FV intake. | Future research should investigate the best effective intervention strategies aimed at promoting increased FV intake among school-aged children. |
| Christina Mushi-Brunt , Debra Haire-Joshu , Michael Elliott & Ross Brownson (2007) | Fruit and Vegetable Intake and Obesity in Preadolescent Children: The Role of Neighborhood Poverty and Grocery Store Access | American Journal of Health Education | The purpose of this study was to examine the relationships between neighborhood characteristics, grocery store availability and accessibility, and parent-reported fruit and vegetable | 798 preadolescent children (ages 6-11) participating in an obesity prevention study | Statistical package for Social Science (SPSS for Windows 11.0) ARC views | 78% of children (mean age = 8.1) failed to meet fruit and vegetable recommendations, and 37% were overweight. Nearly 50% of high poverty neighborhoods had no grocery stores | Future research should further explore barriers to fruit and vegetable purchase at the neighborhood level, specifically addressing the role of the cost of fruits and vegetables available food stores. |

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| | | | intake and/or weight status. | | | within their boundaries. Children in high poverty neighborhoods consumed fewer servings of fruits and vegetables than children in low poverty neighborhoods. | With the additions of this research, the research recommended above and similar studies, it will aid in informing potential community and policy-level preventions efforts. |
| Galvez, M.P., Hong, L., Choi, E., Liao, L., GodBold, J., Brenner, B. (2009) | Childhood Obesity and Neighborhood Food-Store Availability in an Inner-City Community | Academic Pediatrics | The purpose of this study was to investigate urban food environment (convenience stores and fast-food restaurants) of East Harlem, NY and the risk of minority children at risk of suffering from obesity. | Anthropometry (height and weight) of 6-8 years old boys and girls were recorded Food-store data were collected via a walking survey. | SAS 9.1 (Odds ratio Statistical software package) BMI (Body Mass Index) | Convenience stores were present in 55% of the surveyed blocks I which a study participant lived and fast-food restaurants were present in 41%. Children living on a block with one or more convenience stores (range, 1-6) were more likely to have a BMI percentile in the top tertile compared with children having no convenience stores | Further research should include: 1.) The exposures to food stores at different points in the course of child's day en route and from school and after-school activities. 2.) Individual behaviors, including frequency with which children are purchasing from stores on their block of residence. 3.) Quantity and/or quality of purchases |

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| | | | | | | | children are making at various food stores. |
| Dolash, K., Meizi He, Zenong Yin, & Sosa, E. T. (2015) | Factors That Influence park Use and Physical Activity in Predominantly Hispanics and Low-Income Neighborhoods | Journal of Physical Activity and Health | The purpose of this study was to: 1.) Assess whether renovated parks are associated with higher physical activity levels among parks users than non-renovated parks. 2.) To determine if the level of activity differs by various play space types (courts, fields, playgrounds) 3.) Examine reasons people frequent the parks and/or are physically active in the parks and | Data was collected across 6 parks and included park environmental assessments to evaluate park features (Parks and Play Spaces Environmental Audit Tool), physical activity observations to estimate physical activity energy expenditure as kcal/kg/minute per person (Parks and Play Spaces Direct Observation Tool) and park user interviews to assess motivators for park use. | Quantitative data analysis included independent <i>t</i> test and ANOVA Scheffe post hoc NVIVO (QSR NVivo10, 2012) | Parks that were renovated had higher physical activity energy expenditure scores than non-renovated parks. Basketball courts had significantly higher number of vigorously active park users than tennis courts. Qualitative data revealed 4 emerging themes: 1.) Motivation to be physically active 2.) Using the play spaces in the park 3.) Parks as the main place for physical activity & | Future Research: Examine relationship between renovated and non-renovated parks More information from neighborhood residents who are not in the park in order to obtain data regarding what particular renovations could increase park use among those individuals who are difficult to reach. More longitudinal research would help identify how park use impacts physical activity and underlying mechanism by which these changes take place. |

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| | | | 4.) Identify important and modifiable changes that could increase physical activity in the renovated park spaces. | | | 4.) social support for using parks | <p>Future Practices: Parks could be used as interventions sites for low socioeconomic groups.</p> <p>Renovations of existing parks, better promotion of renovated parks and better outreach to community to increase park use.</p> |
| Oh, A. Y., Hennessy, E., McSpadden, K. E., Perna, F. M. (2015) | Contextual Influences on weight Status Among Impoverished Adolescents: Neighborhood Amenities for Physical Activity and State Laws for Physical Education Time Requirements | Journal of Physical Activity and Health | This study examines the relationship between state laws for physical education and neighborhood amenities for physical activity on weight status in adolescents of low socioeconomic status | The two national data sources used were Classification of Laws Associated with School Students (CLASS) and the National Survey of Children's Health (NSCH) were combined and analyzed. | Multinomial logistic regression models, cross sectional analysis | Adolescents in states with strong PE law were associated with a lower odds of being obese; however, when PE law and neighborhood amenities were included, only neighborhood amenities were associated with lower odds of obesity, but also greater odds of overweight status | Since Class and NSCH are public use datasets and continuously collects years of data that is corresponding, it allows for exploration into the relationship between policy and individual health outcomes over time. |

SES, Nutrition & P.A. effects on Youth

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| <p>Donnelly, R., & Springer, A. (2015).</p> | <p>Parental social support, ethnicity, and energy balance–related behaviors in ethnically diverse, Low-income, urban elementary schoolchildren.</p> | <p>Journal of nutrition education and behavior</p> | <p>The purpose of this study is to examine levels of child-reported parent and family social support associated with physical activity (PA) and fruit and vegetable consumption (FVC) by ethnicity among a lower-income sample of US elementary school students.</p> | <p>Analysis of cross-sectional baseline data of elementary school-based study from fall 2010 that consisted of 19 schools in a large urban school district in central Texas. Fourth and fifth grade children and their parents were participants.</p> | <p>Child-reported social support, PA and FVC using descriptive statistics, ANOVA, chi-square test, and multiple linear regressions were examined.</p> | <p>Child reported parent and family social support varied by ethnicity, with Hispanic children consistently reporting the lowest support. Child-reported social support had a positive association across the 3-energy balance related behaviors examined.</p> | <p>Further research can be done by looking into the social and environmental factors that may limit parents’ ability to provide social support.</p> |
| <p>Goodell, L. S., Pierce, M. B., Amico, K. R., & Ferris, A. M. (2012).</p> | <p>Parental information, motivation, and behavioral skills correlate with child sweetened beverage consumption.</p> | <p>Journal of nutrition education and behavior</p> | <p>The purpose of this research was to evaluate the Information-Motivation-Behavioral Skills (IMB) model for its potential utility in characterizing children’s sweet beverages SB consumption</p> | <p>Cross-sectional research where parents completed a home beverage inventory and IMB survey regarding SB consumption. Participants consisted of 198 parent of low socioeconomic areas.</p> | <p>Structural equation analysis</p> | <p>Parental Information had direct and indirect negative relationships with SB consumption. Parental motivation was only indirectly associated with SB consumption mediated through behavioral skills. Parental behavior skills had a negative correlation</p> | <p>Future research can look into comprehensive models of SB consumption is essential to optimize interventions created to improve preschool children’s beverage consumption patterns.</p> |

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| | | | | | | with SB consumption. | |
| Brown, A. F., Vargas, R. B., Ang, A., & Pebley, A. R. (2008) | The neighborhood food resource environment and the health of residents with chronic conditions. | Journal of general internal medicine | The purpose of this research is to understand associations between the neighborhood food resource environment and residents health status and body mass index (BMI) for adults with and without chronic conditions | 2,536 adults from the 2000 – 2001 Los Angeles family and Neighborhood Survey | Cross-sectional multilevel analysis | Health status and BMI are associated with the local food environment, but the associations differ by type of market and presence of a chronic condition. | Future health care providers, policy makers, and community leaders must consider the social and physical conditions of those with, or at risk for chronic conditions to design more effective chronic disease prevention and management strategies. |
| Taber, D. R., Chriqui, J. F., Powell, L. M., Perna, F. M., Robinson, W. R., & Chaloupka, F. J. (2015) | Socioeconomic differences in the association between competitive foods laws and the school food environment | Journal of School Health | The purpose of this study was to conduct a comprehensive assessment of socioeconomic differences in: 1.) school food and beverage environment & 2.) The association between state competitive | 5 th and 8 th grade school administrators reported food and beverages sold in school from the Early Childhood Longitudinal Study-Kindergarten Class (ECLS-K) | Ordinary Least Squares (OLS) regression model, Behavioral Risk Factor Surveillance System (BRFSS), U.S. Census | Strong competitive food laws were positively associated with Healthy School Food Environment Index (HSFEI) in 8 th grade, regardless of SES. Strong competitive beverage laws positively associated with Healthy School Beverage Environment Index | Future research should focus on how students compensate when no healthy alternatives are available in school Schools policy makes and researchers should collaborate with one another to recognize the strengths and limitations of different types of |

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| | | | food laws and the school food/beverage environment. | | | (HSBEI) particularly in low-SES schools in 8 th grade. These associations were attributable to schools selling fewer unhealthy items, not providing healthy alternative, High SES schools sold more healthy items than low-SES schools regardless of state laws. | policies, and explore methods to overcome their respective limitations. |
| Powell, L. M., Slater, S., Chaloupka, F. J., & Harper, D. (2006) | Availability of Physical Activity-Related facilities and Neighborhood Demographic and Socioeconomic Characteristics: A National Study | American Journal of Public Health | The purpose of this study was to examine associations between neighborhood demographic characteristics and the availability of commercial physical activity-related outlets by zip code across the United States | Four Physical Activity related outlet measures: 1.) Physical fitness facilities 2.) Membership sports and recreation clubs 3.) Dance facilities & 4.) Public golf courses. Commercial outlet data were | Multivariate analyses, Poisson count model | Commercial physical activity related facilities were less likely to be present in lower-income neighborhoods an in neighborhoods with higher proportions of African American residents, residents with Hispanic ethnicity, and residents of other racial minority backgrounds. | Future recommendations include examining the relationships between our objective measures of available physical activity-related facilities and individual physical activity behaviors after controlling for individual-level sociodemographic characteristics and other neighborhood factors. |

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| | | | | linked by zip code to US Census Bureau population and socioeconomic data. | | In addition, these neighborhoods had fewer such facilities available | |
| Carlson, J. A., Mignano, A. M., Norman, G. J., McKenzie, T. L., Kerr, J., Arredondo, E. M., Sallis, J. (2014) | Socioeconomic Disparities in Elementary School Practices and Children Physical Activity During School | American Journal of Health Promotion | To examine school socioeconomic status (SES) in relation to school physical activity-related practices and children's physical activity | 97 elementary school (63% response rate) in two U.S. regions. School physical education (PE) teachers or principals responded to 15 yes/no questions on school physical activity supportive practices 172 child participants at an average of 10.2 years of age. (51.7% girls & 69.2% were white non-Hispanic) School SES (low, moderate, high) | Cross sectional Study, School level analyses involved linear and logistic regression; children's MVPA analyses used mixed effects regression. | Low-SES Schools were less likely to have a PE teacher and had fewer physical activity supportive PE practices than did high-SES schools/ practices related to active travel to school were more favorable at Low-SES schools. Children attending high-SES school had 4.4 minutes per day more of MVPA during school than did those at low-SES schools, but this finding was not statistically significant. | Future studies should examine whether school practices mediate the association between SES and children's MVPA during school |

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| | | | | was derived from the percent of students eligible for free and reduced-price lunch. Children's moderate to vigorous physical activity (MVPA) during school was measured with accelerometers. | | | |
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